REMARKS

In the Final Office Action, the Examiner rejected claims 1, 3-11 and 19-23 pursuant to U.S.C. § 102(b) and 103(a) as being anticipated or unpatentable over Adams et al. (U.S. Patent No. 5,937,950). Daane et al. (U.S. Patent No. 6,580,034) is used for the 103(a) rejection of claims 1, 3-11 and 20. Applicants respectfully request reconsideration of the application and claims 1, 3-11 and 19-23, including independent claims 1 and 19.

The withdrawn claims have been cancelled. The election of claims 1-11 and 19-23 in response to restriction requirement is confirmed.

Independent claim 19 claims an ultrasound system with one group ultrasound transducer elements in a transmit aperture and another group of ultrasound transducer elements in a receive aperture. As discussed above, Adams et al. does not disclose ultrasound transducer elements.

The Examiner cites to transducers 22 of Adams et al. for the ultrasound transducer elements. The transducers 22 of Adams et al. are blood pressure transducers (Col. 3, lines 30-32). Fluid filled tubes are used to communicate the blood pressure to the transducers. Blood pressure does not operate at ultrasound frequencies. Ultrasound transducer elements are specific types of devices with material, size and shapes designed for transducing between ultrasound (1-20 MHz) and electric energy. There is no suggestion in Adams et al. that the blood pressure transducers could alternatively be used as ultrasound transducer elements. Blood pressure transducers would have different structures than and would not have been used as ultrasound transducers.

The Examiner treats "ultrasound" transducers as a mere recitation of intended use. However, ultrasound transducers are a specific type of device. Transducers used for blood pressure would not properly function as ultrasound transducers. The wavelength of operation dictates size of transducers and distribution of elements. For example, ultrasound transducer elements are one-half to a full wavelength center to center apart to avoid grating lobes for phased array imaging. This spacing dictates the size of ultrasound transducer elements. No such spacing is shown or suggested by Adams et al. Blood pressure variation is at a vastly different frequency than ultrasound.

The Examiner cited to a slot 62 for holding a cable block 46 as the transmit and receive apertures (col. 4, lines 56-67). In ultrasound systems, the transmit and receive apertures are groups of elements for transmitting and receiving ultrasound. The slot 62 is not a transmit and receive aperture. Claim 19 even claims the transmit and receive apertures as groups of elements in the apertures. In Adams et al., there are no transducer elements in the slot 62. Claim 19 has two groups of ultrasound transducer elements, one group in the transmit aperture and one group in the receive aperture. The slot 62 is a single aperture, not two different apertures. For any one of the above four reasons, Adams et al. does not disclose or suggest the limitations of claim 19.

In a mixed argument, the Examiner alleges the transducers of Adams et al. may perform the function of ultrasound transducers even if not disclosed and then concludes by noting that there is no difference (page 9, argument C paragraph). The ultrasound transducer elements are positively claimed and are different devices than shown by Adams et al. Whether the cable is usable or not with ultrasound does not matter. Adams et al. does not suggest the ultrasound transducer elements of claim 19.

Independent claim 1 claims two groups of 10 or more conductors connected with ultrasound transducer elements where the groups are separated by a conductive separation layer. Adams et al. do not disclose these limitations. Adams et al. describe a cable for blood pressure, one or more pulse sensors, a thermometer, etc. (col. 1, lines 10-20; col. 3, lines 43-46; and col. 6, lines 39-42). As discussed above, the transducer elements or sensors for blood (col. 3, lines 30-32) are not ultrasound transducers. Ultrasound (1-20MHz) transducers have a distinguishable structure, so are not a mere intended use. Adams et al. suggest several types of ongoing monitoring sensors, not ultrasound transducer elements.

Claim 1 claims each group with 10 or more conductors. Since the conductors connect with ultrasound elements used for scanning and not simple ongoing monitoring or blood pressure sensors, a large number of conductors are provided in the cable for scanning with an array. Adams et al. use a mechanical release connector cable block (col. 4, lines 3-14). Given the type of connection, four wires are used (24a-d). When considering alternatives, Adams et al. mention two or three cables, not more (col. 6, lines 35-42). As noted by the Examiner, Adams et al. do not suggest using 10 or more conductors in each of two groups.

A person of ordinary skill in the art would not have used the cable of Adams et al. with ultrasound transducers, such as disclosed in Daane et al. The combined teachings would not have suggested use of the cable of Adams et al. with Daane et al. The mechanical release cable block of Adams et al. for which the cable is designed is undesirable for the large number of conductors used in ultrasound (see Daane et al. Col. 3, lines 31-34). The cable block adds undesired complexity. Since ultrasound is used in a short term examination, a cable and cable block for monitoring a pole by a patient would only interfere with the ultrasound examination. Adams et al. clearly intended the cable to be used for patient monitoring with only a few sensors.

The cable of Adams et al. would not have been used for an ultrasound cable of Daane et al. since Adams et al. and Daane et al. take different approaches to EMI and crosstalk. Daane et al. seeks loose wires along almost the entire length of the cable (col. 2, lines 40-44). The loose wires avoid cross-talk by randomly mixing the wires along the length of the cable (col. 4, line 60 - col. 5, line 10). Daane teaches that a conductive braided shield (62) surrounds all the wires, not different groups of wires (col. 3, lines 21-25) implicitly for EMI reduction. Crosstalk between conductors is handled by using coaxes in one embodiment and the random positioning of the loose conductors. Where the conductors are coaxes, the center conductor is surrounded by a conductive shield 50 (i.e., each conductor has its own shield 50). The individual conductor shields (50) limit crosstalk between individual conductors, not between groups of conductors. In the alternate embodiment, the wires (32') are unshielded (col. 3, lines 63-67). Daane discusses groups of conductors only for purpose of termination. Adams describes a cable bundle with 4 conductors surrounded by a shield (col. 4, lines 12-13), implicitly for EMI protection. Col. 4, lines 20-24 describes separating the transmit from receive, implicitly for crosstalk reduction. Adams et al. use shield layers. Adams et al. and Daane et al. use two different approaches to avoid cross talk and EMI. Since the grouping approach of Adams et al. may have interfered with the random approach of Daane et al., a person of ordinary skill in the art would not have used the ultrasound cable of many conductors of Daane et al. with the shield cable of Adams et al.

The Examiner first notes that the test for obviousness is not whether the features may be bodily incorporated, but what the combined teachings would have suggested. The combined teachings would have suggested that Adams et al. and Daane et al. show two different approaches to EMI. Since the grouping with a shield of Adams et al. would have reduced the effectiveness of the random intermixing of Daane et al., a person of ordinary skill would have chosen one or the other, not both approaches. Since Daane et al. is directed to a large number of cables and Adams et al. is directed to only a few cables, a person of ordinary skill in the art would have chosen the randomized, loose approach of Daane et al. for use with 10 or more cables.

The examiner alleges that it is obvious to "modify the cable assembly of Adam to comprise the signal conductor and shield configuration as taught by Daane." The shield configuration taught by Daane is random placement of conductors. Grouping in a shield as taught by Adams et al. is contrary to random placement. If the shielding of Daane et al. is used as alleged by the Examiner, the shield between groups of Adams et al. would not be.

Based on the teachings of both, a person of ordinary skill in the art would not have modified the cable assembly of Adams et al. with the signal conductor of Daane et al. The cable assembly of Adams et al. is designed for use with a small number of conductors for long term monitoring (see e.g., the mounting block and slot 62). Given the large number of conductors of Daane et al., a person of ordinary skill in the art would not have used the cable assemble of Adams et al.

Hindsight is the only teaching making the use of shielded groups of cables for ultrasound elements obvious as a mere extension of application of obvious attributes. Adams et al. and Daane et al. limit EMI and/or cross talk in different, non-complementary ways. A person of ordinary skill would not have modified Adams et al. with the ultrasound cable and numbers of cables taught by Daane et al.

Dependent claims 3-11 and 20-23 depend from independent claims 1 and 19, so are allowable for the same reasons. Further limitations distinguish over the references used to reject the dependent claims.

Claim 3 claims transmit and receive beamformers. The Examiner cites to transducers 22. A beamformer operates to create relatively delayed and apodized signals for use in an array, so is not a mere transducer or even an array of transducers.

Claim 5-8 and 20 were rejected over Adams et al. in view of Daane et al. As discussed above, a person of ordinary skill in the art would not have used the signal conductors of Daane et al. with the cable assembly of Adams et al.

Regarding claim 5, the use of coaxial cables further teaches away from using the conductors of Daane et al. with the shielding of Adams et al. Coaxial cables have individual shielding. The grouping of Daane et al. occurs at the ends for ease of termination.

Claim 6 claims a ribbon of conductors for the conductors separated by the conductive separation layer. The Examiner cites the ribbons 34 of Daane et al. However, Daane et al. use ribbons at the ends for connection to transducers or circuitry and separate conductors (not ribbons) in the cable (col. 4, lines 35-36 and 64-67 and col. 5, lines 7-10). Daane et al. do not disclose ribbons separated by a conductive shielding layer.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

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